

Barbie Bungee Jump - AI Meets Regression

Grade Level: 11th and 12th	Subject: AP Statistics	Topic/PBL Unit: Two Variable Quantitative Data
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<u>Standards/Skills</u> <i>(2)(A) - (E): apply the statistical problem-solving process</i> <i>(3)(B): use technology to analyze relationships and model data</i> <i>(4)(B): Interpret residuals and assess goodness of fit</i>	<u>Essential Questions</u> Can you predict the amount of rubber bands to use so that Barbie can safely complete her bungee jump? Can AI create a more accurate prediction based on your initial data?
<u>Learning Targets:</u> 1. Collect, organize, and model bungee-jump data using linear regression 2. Compare traditional regression models with an AI based regression built in python 3. Evaluate prediction accuracy and discuss error, bias, and model fit 4. Reflect on how AI learns from data and parallels human statistical reasoning	

<i>Resources Needed:</i> Internet Access to platform for performing the bungee (bleachers in main gym) Internet access	<i>Materials List:</i> Barbie doll or similar figure Rubber bands - same size Meter sticks Tape measure Phone with a camera Chromebook with Google Colab access
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Day 1 - Collect and Model
Review regression vocabulary (explanatory variable, response variable, least-squares regression line, extrapolation). Drop Barbie from the top of the meter sticks with 0-7 rubber bands and record the data in cm. Record the results in the "How Many Rubber Bands Does Barbie Need" handout. Plot x=bands and y= distance and create initial scatterplot. Describe the relationships displayed.

Day 2 - How Good Are the Predictions for Barbie
Students will work through a handout where they have to enter data points into an applet to display a given set of data for a Barbie Bungee jump. The value for 5 is missing however, so the students have to use the applet to find the equation of the regression line and solve for 5 to predict the distance the Barbie dropped for 5 rubber bands. The actual amount is given so then students find the residual Students then practice interpreting the slope and y-intercept from a regression equation
Day 3 - Compute
Students use the Barbie data that they collected to compute the regression line, slope, y-intercept and r value. They use that information to predict how many rubber bands they will need to use for the Barbie Bungee Jump
Day 4 - AI Regression and Comparison - CODING begins
Students will watch a video on how both Regression and AI learn from examples but differ in complexity. We will introduce training data, testing and error. We will begin to write the code for the AI model
Day 5 - CODING continues
Students will continue writing and running code using THEIR data from their initial Barbie drops.
Day 6 - Prediction Challenge
Each group predicts how many rubber bands will make Barbie just miss the ground. They will compare what they found when using their regression equation with their AI model and talk about any bias or variance. They will attach the chosen amount of rubber bands on this day
Day 7 - Barbie Bungee Jump
Students will actually go to the bleachers and let their Barbie bungee jump. One group member will stand at the top while the others wait below. One group member will need to record in slow motion the jump and find the lowest point (if they didn't hit the floor). Group with the closes Barbie to the floor without hitting wins.
Day 8 - Poster
Students will create a digital poster "Can Barbie Trust AI?" using Canva or Google Slides. They will reflect on things such as what the AI model did well or poorly. Summarize how AI predictions mirror regression but with more complexity. They can discuss how Bias in small or skewed datasets parallels bias in real AI models....etc

